IN THE CLAIMS

The following is a complete listing of the claims, and replaces all earlier versions and listings.

1. (Previously Presented) A printed circuit board element, comprising:

at least one optical waveguide provided in an optical layer; and

at least one optoelectronic component in optical connection with the optical waveguide,

wherein the optical layer is a single layer of a photoreactive material capable of two photon absorption processing,

wherein the optoelectronic component is embedded in the optical layer, and

wherein the optical waveguide, which is structured by irradiation and a two photo absorption process, and which adjoins the optoelectronic component, is present within the optical layer.

2. (Previously Presented) The printed circuit board element according to claim 1, wherein the optoelectronic component on one side borders a substrate carrying the optical layer.

3. (Previously Presented) The printed circuit board element according to claim 1, wherein the optoelectronic component is on all sides embedded in the optical layer.

4. (Previously Presented) The printed circuit board element according to claim 3, wherein the optical layer is a flexible layer.

5. (Previously Presented) The printed circuit board element according to claim 1, wherein at least two optoelectronic components connected with each other via the optical waveguide are embedded in the optical layer.

6. (Previously Presented) The printed circuit board element according to claim 1, wherein at least one optoelectronic component borders a heat-dissipation layer on one side.

7. (Previously Presented) The printed circuit board element according to claim 6, wherein the heat dissipation layer is formed by a patterned inner ply.

8. (Previously Presented) The printed circuit board element according to claim 1, wherein the optoelectronic component is combined with an associated electronic component to form an embedded component unit.

9. (Previously Presented) The printed circuit board element according to claim 8, wherein the embedded unit is an optoelectronic chip.

10. (Previously Presented) The printed circuit board element according to claim 1, wherein the optoelectronic component borders upon an electrically conductive distribution layer.

11. (Previously Presented) The printed circuit board element according to claim 10, wherein the distribution layer is connected with at least one external electrical contact.

12. (Previously Presented) The printed circuit board element according to claim 11, wherein the distribution layer is connected with the at least one external electrical contact through a via provided in a substrate that carries the distribution layer and the optical layer.

13. (Previously Presented) The printed circuit board element according to claim 1, wherein a printed circuit board layer having at least one of a patterned, conductive inner ply and an outer ply is applied on at least one side of the optical layer which is an electrically insulating layer.

14. (Previously Presented) The printed circuit board element according to claim 1, wherein the optoelectronic component is contacted through vias provided in the optical layer as well as in a printed circuit board layer applied on the same.

15. (Previously Presented) The printed circuit board element according to claim 14, wherein an electronic component connected with the optoelectronic component is mounted to the printed circuit board layer.

16. (Previously Presented) The printed circuit board element according to claim 1 further comprising at least one optoelectronic component as a component produced in situ by a thin-film technique.

17. (Canceled)

18. (Canceled)

19. (Canceled)

20. (Canceled)

21. (Previously Presented) A method for producing a printed circuit board element, comprising the steps of:

mounting at least one optoelectronic component to a substrate; and

subsequently applying to the substrate an optical layer, comprised of an optical material changing its refractive index under photon irradiation, while embedding the optoelectronic component in the optical layer (3), and thereafter producing an optical waveguide structure adjoining the optoelectronic component within the optical layer by photon irradiation, said optical waveguide structure being surrounded by the remaining optical layer.

22. (Previously Presented) The method according to claim 21, wherein at least two optoelectronic components are mounted to the substrate and embedded in the optical layer and thereafter are connected with each another by the optical waveguide directly adjoining the same.

23. (Previously Presented) The method according to claim 21, wherein after the production of the optical waveguide structure within the optical layer, a printed circuit board layer including at least one of a conductive inner ply and an outer ply is applied to at least one side of said optical layer.

24. (Canceled)

25. (Canceled)

26. (Previously Presented) The method according to claim 23, wherein vias are provided in the optical layer and in the printed circuit board layer, in coordination with the respective optoelectronic component and electrically conductive connections to the optoelectronic component are established through said vias.

27. (Previously Presented) The method according to claim 26, wherein at least one electronic component, which is conductively connected with the optoelectronic component, is mounted to the printed circuit board layer and/or the substrate.

28. (Previously Presented) The method according to claim 21, wherein an optoelectronic component which is combined to a combined optoelectronic-electronic unit with an associated electronic component is mounted to the substrate and embedded in the optical layer.

29. (Canceled)

30. (Previously Presented) The method according to claim 44, wherein the cover layer is comprised of optical material, and is applied to the substrate.

31. (Canceled)

32. (Currently Amended) The method according to claim [[31]] 45, wherein electrical connections for the optoelectronic component are established throughout the distribution layer.

33. (Canceled)

34. (Previously Presented) The method according to claim 21, wherein the optoelectronic component is produced in situ on the substrate by a thin-film technique.

35. (Canceled)

36. (Canceled)

37. (Canceled)

38. (Previously Presented) The printed circuit board element according to claim 1, wherein the optoelectronic component is a VCSEL component to which the optical waveguide adjoins with an arc-shaped transition.

39. (Previously Presented) The printed circuit board element according to claim 1, wherein the optical waveguide is widened in a funnel-shaped manner on its end adjacent the optoelectronic component.

40. (Previously Presented) The printed circuit board element according to claim 1, wherein the optical waveguide at least partially encloses the optoelectronic component on its end adjacent the optoelectronic component.

41. (Previously Presented) The printed circuit board element according to claim 1, wherein the optical waveguide is provided with a photonic light-diffractive crystal structure on its end adjacent the optoelectronic component.

42. (Previously Presented) The method according to claim 23, wherein the inner ply is patterned before applying the printed circuit board layer to the optical layer.

43. (Previously Presented) The method according to claim 23, wherein the outer ply is patterned after the application of the printed circuit board layer to the optical layer.

44. (Previously Presented) The method according to claim 21, wherein the substrate is provided with at least one cover layer before applying the optoelectronic component thereto.

45. (Currently Amended) The method according to claim [[29]] 44, wherein an electrically conductive cover layer is applied to the substrate as a distribution layer, said distribution layer being subsequently patterned, if required.

46. (Currently Amended) The method according to claim [[31]] 45, wherein the distribution layer is configured as a heat-dissipation layer.

47. (Previously Presented) The method according to claim 21, wherein the optical waveguide structure is produced with a funnel-shaped widening on its end adjacent the optoelectronic component.

48. (Previously Presented) The method according to claim 21, wherein the optical waveguide structure is produced with an end region at least partially enclosing the optoelectronic component.

49. (Previously Presented) The method according to claim 21, wherein the optical waveguide structure is produced with a photonic light-diffractive crystal structure on its end adjacent the optoelectronic component.